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FEEZOR ENGINEERING, INC.

REVISED INTERIM LEACHATE MANAGEMENT PLAN

BRIDGETON LANDFILL

BRIDGETON, ST. LOUIS COUNTY, MISSOURI

Prepared For:
Bridgeton Landfill, LLC
13570 St. Charles Rock Road

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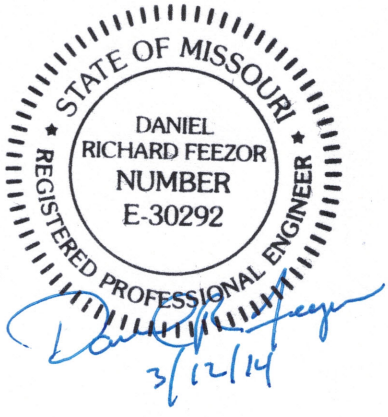

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Revised Interim Leachate Management Plan (2 - One Million Gallon Tank Operation)

Bridgeton Landfill, LLC

Bridgeton Landfill is currently generating up to 240,000 gallons of liquids per day (leachate and landfill gas condensate). Hereinafter, the term leachate is used to describe the comingled mixture of landfill leachate and gas condensate. Chemical composition of the produced liquid typically includes a BOD concentration of approximately 20,000 mg/L (PPM) and 1,000-1,500 µg/L (PPB) total benzene. Due to previous BOD loadings to its system, the Metropolitan St. Louis Sewer District (MSD) initially suspended disposal of the liquids from the site via a direct discharge sewer connection. The MSD suspension resulted in the need for the Bridgeton Landfill to establish alternative disposal methods, under the auspices of an emergency Interim Leachate Management Plan. The narratives and attachments contained herein describe previous, current, and planned operations for interim leachate management.

Leachate has been and will continue to be treated to reduce total benzene concentrations using aeration and agitation (mixing and/or recirculation). Interim Leachate Management has been conceptually illustrated via flow charts submitted to the Missouri Department of Natural Resources (MDNR) in previous submittals. There are a number of challenges with the processing system. Timing available storage, allowing for adequate processing, following appropriate sampling protocols, complying with varied analytical requirements, and coordinating with multiple transportation companies and disposal sites continues to require diligent management of a complicated, evolving leachate handling system.

The early use of several series of frac tanks for leachate storage and processing was replaced by a 316,000-gallon tank that provides significantly increased batch aeration capacity. The 316,000-gallon tank will continue to play an important role in the leachate pre-treatment facility currently undergoing design, permitting, and construction work. Once operational, the pre-treatment facility will be tributary to the MSD sanitary collection system and will include four 1 million-gallon capacity tanks. All four 1 million-gallon capacity tanks will be constructed prior to the pre-treatment plant becoming operational, as will the entire secondary containment structure designed to encompass all four tanks. Operations of the pre-treatment plant before final facility construction will utilize only two of the tanks for leachate storage and pre-processing. The remaining two tanks will be used for other pre-treatment processes.

Bridgeton Landfill developed and implemented protocols to pre-treat (as necessary), transport, and dispose of leachate collected at the facility. Interim leachate management necessitated the following liquids handling programs:

1) Leachate Collection – collection and transfer of leachate from the landfill and gas condensate from the site's LFG system,

2) Leachate Storage – temporary storage of raw and processed leachate,

3) Leachate Processing – aeration of raw leachate to reduce concentrations of dissolved volatile organic compounds; additional technologies are under development, and

4) Leachate Disposal - logistical planning for transporting processed leachate to off-site facilities for disposal, using appropriate waste characterization, manifesting, and reporting procedures.

The Revised Interim Leachate Management Plan herein amends both the original May 2013 Interim Management Plan and the December 2013 Revised Interim Leachate Management Plan. **Figure 1** (Revised Interim Leachate Management Plan Processing Schematic) and CEC **Drawing C206** (Interim Operations Valve and Pump Diagram) represent modified versions of the interim system. Information regarding the current thermal oxidizer (TO) being used at the site, the TO proposed for incorporation into the pre-treatment facility, and the pump(s) to be used to transfer pre-processed leachate from the 1 million-gallon capacity tank to the 316,000-gallon tank is included in this document.

1 LEACHATE COLLECTION

Leachate at Bridgeton Landfill is collected from numerous sources and transmitted from the collection points via fusion-welded high-density polyethylene (HDPE) piping. Gas condensate from the landfill gas control & collection system is co-mingled with leachate into a HDPE forcemain. As of March 2014, the following sources, each equipped with pumps, contribute to the leachate flow at the Bridgeton Landfill:

- 6 leachate collection sumps (LCS),
- 12 reinforced concrete pipe (RCP) structures,
- 13 gas interceptor wells (GIW),
- 20 header condensate traps (CT),
- 8 frac tanks used to capture artesian liquids,
- 5 horizontal collectors (HZ),
- 26 lateral sumps (LS),
- 4 trench sumps (TS),
- 25 perimeter sumps (PS),
- 35 perimeter extraction wells (PEW), and
- Approximately 50 vertical gas extraction wells (GEW).

Liquids are collected from the landfill under Permit 118912. No leachate is collected from the OU-1 Area. Daily production of liquids varies, but rates as high as 361,000 gallons per day have been calculated. The layout of the Interim Leachate Management System is depicted on **Figure 1** entitled "Revised Interim Leachate Management Plan Processing Schematic".

2 LEACHATE STORAGE

Historically, leachate storage for interim leachate management was provided by several series of tanks (portable and fixed) interconnected by either rigid or flexible piping/hoses. For the purposes of this Plan, the portable tanks are referred to herein as "frac tanks", a generic term for mobile steel tanks used to hold liquids such as stormwater, fuel, and leachate. They are typically constructed of single-wall carbon steel, have nominal capacities of 21,000 gallons, and are equipped with a single rear axle. The frac tanks can be moved (when empty) using construction equipment or trucks equipped with cables and winches. The frac tanks utilized for leachate storage and processing at Bridgeton Landfill meet the definition of "containers" under 40 CFR 262 and 265 and are compliant with applicable Missouri and federal hazardous waste management regulations.

Previously, leachate was conveyed to frac tanks from the co-mingled forcemain via combinations of HDPE piping and flexible hoses with cam-lock fittings. The use of frac tanks is currently limited to providing additional storage capacity of raw leachate and/or liquids generated during on-site leachate release response (i.e. impacted stormwater), and six frac tanks hold approved material to be shipped to the disposal sites. As of March 12, 2014, twenty-two (22) frac tanks remain on-site and available for temporary storage. As many as 236 frac tanks were utilized at one point as part of the facility's leachate management system. The frac tanks were provided by Rain-for-Rent, Adler, and BakerCorp. **Appendix A** of the original Plan submittal includes specifications for the various models/configurations of frac tanks utilized at the facility.

The number and layout of frac tanks at Bridgeton Landfill changed over time as the needs for storage capacity changed. Initially, liquid comprised only of gas condensate was stored in several series of frac tanks interconnected using flexible hoses. Each of these tanks was eventually emptied, cleaned in accordance with the vendors' requirements, and removed from the facility (September 15, 2013).

Former tank batteries TB-1, TB-2, TB-3, TB-4, TB-7, TB-8, Sparge 1, and Sparge 2 were each comprised of 4 frac tanks manifolded together, and were used to aerate leachate as briefly described in the next section. TB-5 and TB-6 also consisted of 4 manifolded frac tanks each; they were not equipped for aeration but instead served as storage for leachate that had been processed to the point that there was no detectable benzene (<14 ppb). Batteries TB-1, TB-2, TB-3, and TB-4 remain at the facility. TB-5, TB-6, TB-7, TB-8, Sparge 1, and Sparge 2 were emptied, cleaned, disassembled, and removed from the site by September 30, 2013. A current inventory of the frac tanks on site is included in **Appendix B**.

Another series of 24 frac tanks is still located at Bridgeton Landfill. These interconnected tanks are referred to as the Buffer Tank Farm (BTF), which serves as a 505,000-gallon reservoir for raw leachate generated by the landfill. Leachate is currently pumped from the BTF to the 316,000-gallon tank for processing and loading on a daily basis. The BTF will

continue to serve as a reservoir for untreated landfill liquids until the 1 million-gallon capacity tank has been tested and becomes fully operational. The BTF will be cleaned, disassembled, and removed from the site in similar fashion to the other frac tank assemblies once it has been replaced by the 1 million-gallon capacity tank (est. 1Q2014).

The 316,000-gallon Aquastore tank was erected in early 2013. Concrete secondary containment has been constructed around the tank. The 316,000-gallon tank currently receives untreated Bridgeton Landfill liquids via the BTF, processes the leachate (aeration and agitation) to reduce concentrations of benzene, and discharges the liquid once analysis indicates compliance. Liquid approved for disposal is either loaded out to tanker trucks or transferred to the 96,000-gallon tank described below.

A 96,000-gallon aboveground storage tank represents the original leachate holding tank at Bridgeton Landfill. This tank is still being utilized as a holding vessel for leachate that has been processed in the 316,000-gallon tank and transferred via dual-contained piping. Concrete secondary containment encompasses the tank. Leachate approved for disposal is discharged from the 96,000-gallon tank to MSD's Missouri River Wastewater Treatment Plant. Discharge is metered from the tank to a nearby lift station.

3 LEACHATE PROCESSING

Frac tanks used for processing were retrofitted with piping to allow collected liquids to be aerated ("sparged") during the filling process. Sparge batteries consist of four frac tanks connected to air compressors that deliver air to the aeration piping in each tank (18 psi). When the frac tank sparge batteries are being used, aeration is applied for a minimum of 5 hours. Batteries TB-1 through TB-4 (still on-site), Sparge 1, Sparge 2, TB-7, and TB-8 (since removed) were equipped for aeration; TB-5 and TB-6 (also since removed from the site) were not so equipped. Following aeration, samples are collected from the sparge batteries and submitted to an on-site laboratory for volatile organic analysis (8260).

During frac tank filling and aeration, the headspace in each sparge battery is under vacuum to allow for treatment of off-gas by an activated carbon system. Vacuum is maintained by 50 hp, 460V, 3 Ph centrifugal blowers that direct off-gas through 20,000 lbs of vapor phase carbon.

Processing of leachate in the 316,000-gallon tank follows the same principle as that used in the frac tanks, with an additional component. The 316,000-gallon tank relies on two Kaeser 433 cfm blowers to aerate material that has been transferred from the BTF to the tank. The 316,000-gallon tank is also equipped with an MTS Jet Mix System used to recirculate the leachate in the tank. Tank headspace is under vacuum; off-gas is routed through a thermal oxidizer (TO) described shortly.

Operational sampling of the 316,000-gallon tank follows the same protocol as was employed for the former frac tanks. Current protocol dictates that the sample is acceptable for non-hazardous disposal if 8260 analysis indicates <300 ppb total benzene, with the exception of the Metropolitan St. Louis Sewer District (<140 ppb benzene acceptance limit) and the American Bottoms facility in Sauget, Illinois (<130 ppb benzene acceptance limit).

Off-gas from the 316,000-gallon tank is routed through a thermal oxidizer for destruction of volatile organics. The TO, manufactured by Intellishare Environmental, operates at air flow capacities of 400-1,200 scfm and temperatures ranging from 1,400°-1,600° F, with a VOC destruction efficiency of >98%. A thermal oxidizer with an air flow capacity of 5,000 scfm will be used to treat off-gas from the 1 million-gallon capacity tank once it becomes operational.

Appendix C includes specifications for the various leachate processing equipment utilized in the facility's leachate management system. Details regarding both of the aforementioned thermal oxidizers and the pump to be employed to transfer leachate from the 1 million-gallon capacity tank (under construction) to the 316,000-gallon tank has been included in this submittal as an addendum to the original **Appendix C**.

4 LEACHATE DISPOSAL

4.1 DISPOSAL FACILITIES

Once the processed leachate has been tested and approved for disposal, it is trucked as non-hazardous waste to various disposal facilities or direct discharged to MSD's sanitary system. Historically, the Bridgeton Landfill routed stored gas condensate to four hazardous waste facilities (see below). Hazardous waste shipments were completed in May 2013. Since that time, processed leachate has been disposed at more than a dozen non-hazardous treatment facilities. Currently utilized disposal facilities include MSD's Bissell Point facility, MSD's Missouri River plant, and American Bottoms wastewater treatment facility in Sauget, Illinois.

4.1.1 Hazardous Waste Disposal Facilities

Historically, leachate with total benzene concentrations over 500 ppb was primarily disposed at the following facilities:

Clean Harbors Canada Inc.
4090 Telfer Road RR #1
Corunna, ON N0N 1G0

Clean Harbors Deer Park, LLC
2027 Independence Parkway South
La Porte, TX 77571

Clean Harbors Env. Services Inc.
2247 South Highway 71
Kimball, NE 69145

4.1.2 Non – Hazardous Waste Disposal Facilities

Non-hazardous disposal options are currently being provided by Metropolitan St. Louis Sewer District and the American Bottoms Regional Wastewater Treatment Facility:

MSD Bissell Point Wastewater Treatment Plant
10 East Grand Avenue
St. Louis, MO 63147

MSD Missouri River Wastewater Treatment Plant
3455 Creve Coeur Mill Road
Maryland Heights, MO 63043

American Bottoms
1 American Bottoms Road
Sauget, IL 62201

MSD's Bissell Point plant currently allows for up to 200,000 gallons per day to be disposed at the facility. Discharge to the MSD Missouri River plant is currently limited to 20,000 gallons per day, but only during non-disinfection time periods. The Missouri River plant also has a maximum flow limitation of 1,500 gallons per hour. American Bottoms is currently accepting up to 37,500 gallons per day. Discharge to the Missouri River treatment plant uses a metering system on the 96,000-gallon tank to limit flow rate and 24-hour total flow. Leachate designated for disposal at Bissell Point and American Bottoms is loaded out of the 316,000-gallon tank and hauled by tanker truck.

MSD and American Bottoms approval protocols include operational sampling and on-site analyses to determine acceptable/unacceptable benzene and MEK concentrations, followed by confirmation sampling and off-site laboratory analyses of approved batches. MSD's acceptable benzene concentration is currently <140 ppb, but Bridgeton Landfill uses a 130 ppb threshold as a safety factor. American Bottoms uses <130 ppb benzene and <100,000 ppb MEK acceptance concentrations. Discharge to the Missouri River plant also requires compliance with a pH limit of >5.5 standard units. The Metropolitan St. Louis Sewer District (MSD) - April 24, 2013 Emergency and Conditional Approval Letter is included in **Appendix D**.

4.2 MANIFESTING PROCEDURES

Each load of processed leachate that leaves the facility is accompanied by a manifest completed by the generator (Bridgeton Landfill) and the transporting company. Hazardous loads previously hauled from the site also included completed Land Disposal Restriction forms. Manifests document information about the generator of the waste, the transporter of the waste, and the designated disposal facility for the waste. A generator's representative and a representative of the transportation company signs each manifest upon departure from the facility. A copy is kept on site. Once the transportation company delivers the load to the disposal facility, the disposal facility signs to accept the waste and keeps a copy of the manifest.

Data associated with the Interim Leachate Management System are abundant. Daily decisions are made based upon these data. Therefore, order and organization are imperative, and to achieve this, data throughout the process are collected and stored in a database that includes, but is not limited to, the following information:

- Dates of loading, transport, and disposal,
- Volumes of leachate processed,
- Batch identifiers,
- Filling and processing start / stop times,
- Analytical testing results for each batch,
- Driver, vehicle, and load information,

- Manifest information

A leachate manager coordinates and schedules tasks associated with the collection, storage, processing, sampling/analysis, transporting, and disposal of the leachate. These tasks include, but are not limited to:

- Communicating with hauling companies and disposal facilities each day with information regarding number of loads, volume expected, and leachate quality,
- Review of completed manifests and loading tickets for completeness and accuracy,
- Collecting operational and/or confirmation samples and coordinating delivery to the laboratories,
- Review and distribution of analytical results,
- Optimizing component processes,
- Summarizing the day's issues/results and the planned efforts for the following day

5 ONE MILLION-GALLON TANK INTERIM USE

Bridgeton Landfill is currently designing, permitting, and constructing a pre-treatment facility which will be tributary to the MSD sanitary collection system. The pre-treatment plant will incorporate the use of four 1 million-gallon capacity tanks in the pre-treatment process. One of the 1 million-gallon capacity tanks will be used for storage and pre-processing (aeration and mixing), followed by transfer of the pre-processed material to either the new 1 million gallon aeration tank or to the existing 316,000-gallon tank for additional aeration/mixing and load-out.

5.1 LEACHATE FLOW FROM THE LANDFILL TO THE 1 MILLION-GALLON CAPACITY TANK

A 1 million-gallon capacity aboveground storage tank (AST) will functionally replace the Buffer Tank Farm (described previously) as a leachate reservoir and will also serve to pre-process raw leachate before transferring it to the 316,000-gallon tank or the 1 million gallon processing tank. Co-mingled leachate and gas condensate generated at the landfill will be routed to the 1 million-gallon capacity tank via dual-contained forcemain. Leachate will be subjected to the aeration and mixing processes described earlier, then transferred to the smaller tank (or other 1 million gallon aeration tank) for final polishing before approval and load-out. The aeration time needed in the process (aeration) tanks to achieve passable benzene concentrations is expected to be significantly reduced since the material will have been pre-processed in the 1 million-gallon capacity tank. All piping outside of the secondary containment structures erected around the 1 million-gallon and 316,000-gallon tanks will be dual-contained. Piping inside the secondary containment structures will be single-walled and heat traced.

5.2 PRE-TREATMENT AND AERATION OF LEACHATE IN 1 MILLION-GALLON CAPACITY TANK(S)

Each of the first two 1 million-gallon capacity tanks will be equipped with an aeration system designed to apply the same basic technology as used in the original frac tank sparge batteries and in the 316,000-gallon tank being used now for treating leachate. As described in Section 5.1, one 1million gallon tank will receive the incoming leachate from the landfill. The other 1 million gallon tank will receive leachate from the buffer 1 million gallon tank, and will be aerated in a similar method as in the existing 316,000 gallon tank.

The buffer 1 million-gallon capacity tank will be equipped with two blowers, each capable of applying 2,100 scfm of air to aerate liquids as they enter the tank, as the material resides in the tank, and during transfer to the 316,000-gallon tank or the aeration 1 million gallon tank. This tank incorporates a mixing system which involves a recirculation pump which is designed to reduce concentrations of volatile organic compounds in the leachate, while at the same time hindering the accumulation of settleable solids in the tanks so equipped.

The processing 1 million-gallon capacity tank will be equipped with two blowers, each capable of applying 800 scfm of air to aerate liquids in a similar manner as the 316,000 gallon aeration tank. This tank also incorporates a mixing system which involves a recirculation pump which is designed to reduce concentrations of volatile organic

compounds in the leachate, while at the same time hindering the accumulation of settleable solids in the tanks so equipped.

The flow of leachate as described in this section is depicted graphically in **Figure 1 – Revised Interim Leachate Management Plan Processing Schematic**.

Appendices

Appendix A – Frac Tank Information

Appendix B – Interim Management Plan Tank Inventory

Appendix C – Interim Leachate Management Plan Processing Equipment

Appendix D – Metropolitan St. Louis Sewer District (MSD) – April 24, 2013 Emergency and Conditional Approval Letter

Figures

Figure 1 – Revised Interim Leachate Management Plan Processing Schematic

CEC Drawing C206 – Interim Operations Valve and Pump Diagram